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PART 8.

DECEMBER, 1913.

THE
BRITISH WARBLERS

A HISTORY WITH PROBLEMS
OF
THEIR LIVES

BY

H. ELIOT HOWARD, F.Z.S., M.B.O.U.

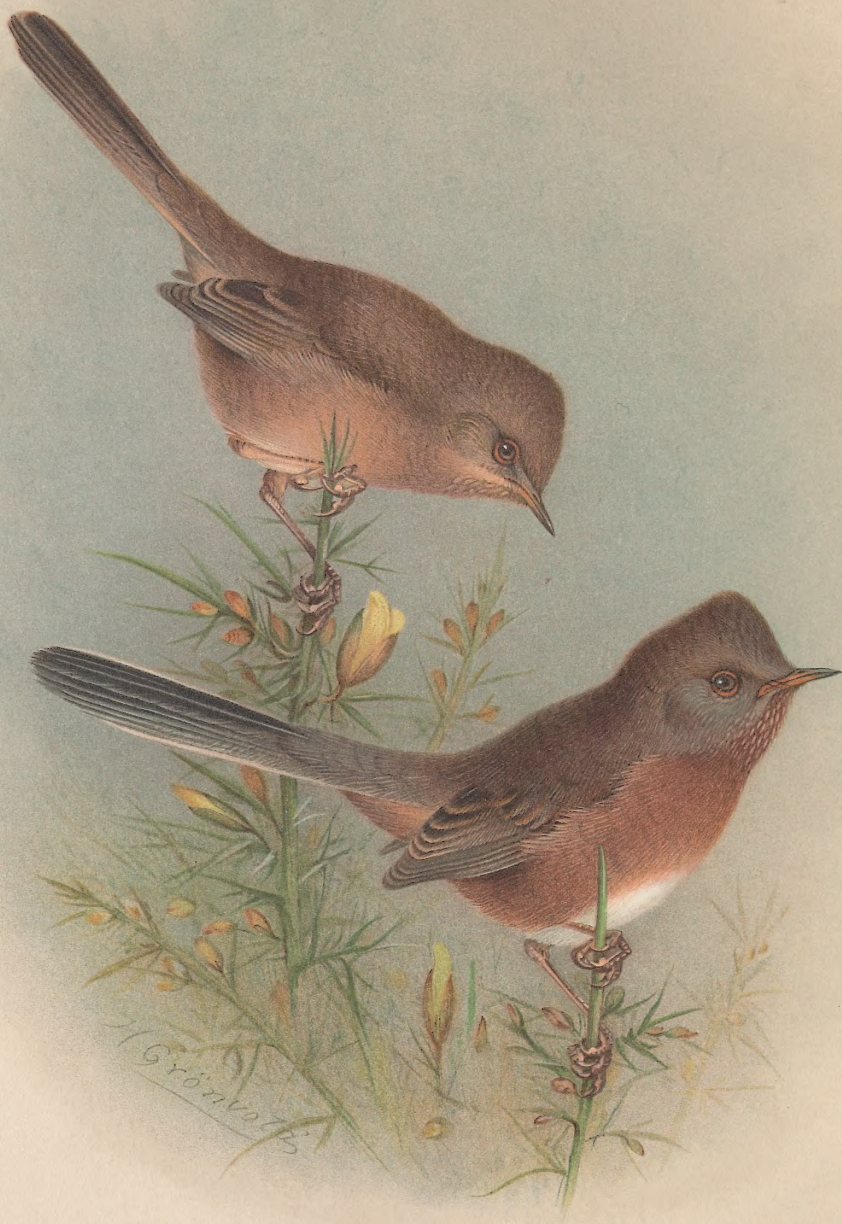
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DARTFORD-WARBLER.

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Part 5

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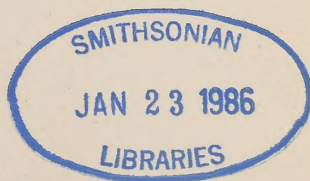
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- Sylvia hortensis**, Meyer, *British Birds*, Folio Ed., vol i, pl. 64 (coloured figure of adult and egg) [1835-43]; Macgillivray, *British Birds*, vol. ii, pp. 345-349 (woodcut of head), 1839; Hewitson, *Eggs of British Birds*, 3rd Ed., vol. i, pp. 128-129, pl. 34, figs. 3 and 4 (eggs), 1856; Seebohm, *British Birds*, vol. i, pp. 400-404, pl. 10, fig. 2 (egg), 1883; Lilford, *Coloured Figures*, vol. iii, p. 54, pl. 27 (coloured figure of adult), 1886; Saunders, *Manual of British Birds*, 2nd Ed., pp. 49-50 (woodcut), 1897.
- Curruca hortensis**, Hewitson, *British Oology*, 1st Ed., vol. i, pl. 42, figs. 1 and 2 (eggs), 1833; *Id.*, *Eggs of British Birds*, 2nd Ed., vol. i, p. 95, pl. 27, fig. 3 (egg), 1846; Gould, *Birds of Great Britain*, vol. ii, 2 pp., pl. 62 (coloured figures of adults), 1865; Booth, *Rough Notes*, vol. ii, p. 57, 1883.
- Sylvia salicaria**, Yarrell, *British Birds*, 4th Ed., vol. i, edited by Newton, pp. 414-417 (woodcut), 1873; Dresser, *Birds of Europe*, vol. ii, pp. 429-433, pl. 67 (coloured figure of adult male), 1876.

Danish, *Havesanger*; Dutch, *Tuinfluiter*; French, *Fauvette des Jardins*; German, *Garten-Grasmücke*; Italian, *Beccafico*; Hungarian, *Kerti Poszata*; Russian, *Travnik*; Spanish, *Pinzoleta Piula*; Swedish, *Häcksångare*.

DESCRIPTION OF THE PLUMAGE.

Adult Male in Spring.—The upper parts are uniform olive brown, the wings and tail being slightly darker. The flight and tail feathers are tipped with light brown, the innermost secondaries being broadly edged with the same colour. The lores are ashy grey, ear-coverts the same colour as the upper parts though rather lighter, and the sides of the neck slightly suffused with ash grey. The underparts and under tail-coverts are whitish grey, whilst the upper breast and flanks are washed with light olive. The underside of the tail is grey with white shafts to the feathers, underside of the wing greyish and the under wing-coverts and axillaries pale cinnamon buff. The bill is horn brown, becoming more lead colour towards the tip and buffish flesh at the base of the lower mandible, the mouth being flesh colour. Iris is dark brown. The feet are

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whitish grey, the claws having dark brown points, and the soles are yellowish. The sexes are alike in plumage.

The autumn plumage of both sexes differs from the spring plumage in being darker and slightly more olive green on the upper parts and richer buff on the under parts.

Nestling.—The general colour of the upper parts is very similar to that of the adult but rather more olive, a faint superciliary stripe being noticeable. The throat is whitish, upper breast and flanks olive brown, the latter being rather lighter and more buffish, abdomen pure white, and the under tail-coverts pure buff. The wings and tail differ but little as regards colour from those of the adult. The bill is lavender brown, flesh colour at the base, and the flanges bright yellow surrounded apparently by crimson, which is caused by the rich blood red colour of the inside of the mouth. Iris is dark greyish brown and the lores and region round the eye dark lavender. The feet are light lavender, and the front part of the tarsus and the upper part of the toes bluish.

GEOGRAPHICAL DISTRIBUTION.

Except in the west of Cornwall and the southern part of Cumberland, this bird seems to be a common breeding species in **England**. In **Wales**, however, there are a number of districts which it only visits rarely, such as west Pembrokeshire, the northern parts of Denbigh, Flint and Merioneth, and Anglesey and Carnarvon. In the south-western parts of **Scotland**, as well as in the Clyde and Forth areas and in Perthshire, it is apparently fairly common, but does not breed north of these limits. On migration it passes the Outer Hebrides, St. Kilda, Sule Skerry, the Shetlands, Orkneys and Fair Isle. To **Ireland** it is a regular but local visitor, breeding in Tipperary, Roscommon, Sligo, Fermanagh, Cavan, Waterford, Cork, Wexford, Queen's County, Monaghan, Down, and Antrim.

Throughout **Spain** and **Portugal**, **France**, **Belgium** and **Holland** it is generally distributed, but in **Switzerland** not

GARDEN WARBLER

very plentiful. In **Norway** and **Sweden** it occurs generally as far as 68° N. lat. in Sweden and 70° in Norway, but above this rarely. Throughout **Germany** and the **Austro-Hungarian Monarchy** it is numerous, and occurs in small numbers in northern Italy, but is absent from the south. In the **Balkan Peninsula** it breeds in **Montenegro**, Herzegovina, Epirus and Dobrudscha, but **Greece** is visited only on migration, though it has been said to breed in **Palestine**. To **Poland**, the **Baltic Provinces**, and central and southern **Russia** as far as the province of Ufa we find it a common summer visitor, but less numerous in the province of Orenburg. Northward it is found as far as southern **Finland**, the Olonetz Government, Archangel, and lat. 62° in the Urals, and on migration has been recorded in the Kirghiz Steppes, Astrakhan, and the Crimea. Eastwards it has been recorded at Krasnoyarsk on the River Yenisei, whilst to the south it has been found on the northern side of the Caucasus and in Trans-Caucasia. There are records also from **Persia**, and it occurs as a breeding species in **Tunis**, **Algeria** and **Morocco**.

It winters for the most part in central and southern **Africa** as far as Natal and Damara Land.

LIFE HISTORY.

The Garden Warbler seldom reaches this country before the latter half of April, and it is therefore some weeks later than the Blackcap. In the northern districts of Worcester-shire its advent is usually delayed until the first week in May, although in some years a few individuals can be found during the last week in April. Comparing one year with another, there seems to be less variation in the date of arrival of the first male than is customary amongst certain other migrants. For instance, during the last eleven years my records show that the first male reached this particular district once on April 28th and 30th respectively, twice on May 1st, once on May 3rd, four times on May 4th, once on May 6th and once on May 10th. The period of arrival

is spread over some considerable time; males continue to arrive up to the latter end of May and perhaps even later than this, but it is impossible to say whether all such males are true arrivals or simply individuals that so far have failed to secure a territory. It is evident that in the case of all the more common migratory species, certain individuals will be compelled to wander about in search of territories, and their difficulties in finding them will be great or small according to the environment which they are accustomed to inhabit. The Garden Warbler can no more escape these difficulties than other members of the genus. And so when we think we observe fresh arrivals appropriating territories in the latter part of May we may well be mistaken; what we really observe being nothing but a process of re-arrangement brought about by some change in the available territories of the district. A new breeding ground is often supplied by the clearing away of young trees or the felling of timber in some wood, and the first to take advantage of it will probably be the young males of the surrounding districts, thereby temporarily reducing the severity of the struggle in the immediate neighbourhood. Such re-arrangements I have observed taking place; on the one hand the gradual appropriation of every available space of ground, and, on the other, the gradual desertion of territories as they became unsuited to the requirements of the birds.

The localities inhabited by the bird are similar to those in which we are accustomed to find the Blackcap common. Large or small woods, coppices, osier beds, wooded banks, gardens, or even the outskirts of the forest, afford the necessary shelter; and it would be difficult to point to any one particular type of woodland for which a partiality is shown. The relative number of individuals which visit any one particular locality year by year is subject to some variation; in one season the birds may be plentiful everywhere, in another only moderately so, whilst in a third scarce, a peculiarity which is shared with other migrants. Of the

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cause of the abundance or paucity we are more or less ignorant. The only factor we can point to with certainty as affecting the question is the danger attendant on migration, for large numbers must succumb annually from one cause or another on the perilous journey to and from the winter home, but no suggestion has yet been put forward which would adequately explain so wide a fluctuation. Many subtle causes might contribute towards such a result; even a slight alteration in the proportion of the sexes would influence the numerical standing of a species, but I have no evidence of its occurrence in Nature.

At the commencement of the migratory movement males arrive before females. The first males generally precede the first females by a week or ten days, but the difference in the time of arrival of the sexes is, though considerable, not so great as that found amongst some migrants. Since the bird is one of the later migrants to reach its breeding grounds, a day gained or lost when the season is already advanced is of importance, so that we should expect to find the females following quickly in the wake of the males, even though this were not borne out by actual observation.

The behaviour of the species is very similar to that of the Blackcap, to which it is closely related. Upon arrival at its destination the male appropriates a territory and forthwith proceeds to proclaim the fact by incessantly pouring out its song. It would seem that some at least of the males arrive during the night, for fresh arrivals are generally first heard during the early hours of the morning. Of course it is open to question whether these males may not have actually arrived on the previous day; they may have been fatigued or hungry, and therefore not inclined to sing. Judging however by the behaviour of other species, taking into consideration how important it must be for every individual to proclaim its possession of a territory as early as possible, and bearing in mind that migration, generally speaking, does for the most part occur during the night, we shall probably be right in

regarding the hours of darkness as the period of maximum activity so far as movement from place to place is concerned. We can observe but little trace of fatigue in these smaller migrants. One would expect to find evidence of the long journey—to see travel-stained, weary individuals—but, excepting in isolated cases which occur for the most part amongst those species which face the storms of early spring, the majority of the newcomers are on arrival just as vigorous as they are a week or so later, neither do they show by their plumage any trace of the difficulties through which they have passed. The male awaits the arrival of a female in his territory, and until she appears upon the scene passes the greater part of his time in song or in searching for food. He wanders restlessly around his territory, but his wanderings are subject to that routine which is a peculiarity of so many species. A habit is thus formed in his journeyings backwards and forwards. Time after time one can observe the same tree or bush searched for food and the same line of flight taken between the various trees. A certain tree or clump of trees is often especially favoured and used as a headquarters, from which he proclaims his presence by song. The territories vary in size according to the nature of the environment in which they are situated, and according, I fancy, to the numerical standing of the species in the particular locality. In large woods they are often extensive, but in osier beds and plantations considerably smaller; in the former case the wanderings of the male may cover as much as five acres of woodland, in the latter the bird has to be content with an acre or even less. Where the birds are numerous and territories adjoin one another, it is evident that the movements of the males must be restricted; the dimensions therefore become regulated automatically, and are no doubt reduced to the minimum size necessary for the welfare of the species. With regard to the initial struggles between the males touching the question of territory, I have little evidence. The females follow so

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quickly in their wake that it is seldom we find two or three adjoining territories occupied by single individuals; a female is generally present in one of them, and her presence seems to stimulate the sexual instinct of all the males in the immediate vicinity, and to render the corresponding emotion of pugnacity proportionately active. It is, moreover, by no means easy to discover the female when the foliage is well advanced, a fact which adds to the difficulty of obtaining reliable information. I have, however, noticed some males fighting early in the season when there was no reason to suspect the presence of a female. Quarrels become of frequent occurrence when a fair proportion of the males have arrived and taken possession of adjoining territories, and such quarrels are more frequent on the boundaries than in the centre of a territory. Since the migration of the females is spread over some considerable time, it often happens that one of two males with territories adjoining obtains a female some few days before his neighbour, and this results in much disturbance. The female wanders about the territory in which she has settled, but does not confine herself so strictly to the limits as her mate; when therefore she intrudes upon a neighbouring preserve and is followed by her mate, considerable excitement ensues. The male, whose territory is invaded, flies towards the intruder, spreads his tail, raises the feathers of his body, and gives vent to his feelings by uttering his song or harsh alarm note, which is sometimes sufficient to make the intruder beat a retreat, but if it does not do so, the disturbance is liable to be continued, and the excitement may even become so acute as to cause a commotion in the bird life of the surrounding district. The owner then follows the intruder, and conflicts occur in which there is much fluttering of wings and snapping of bills. One of the most interesting features of the accompanying behaviour is the passionate utterance of the song. The usual song of the species is an even flowing warble, but on occasions such as I am describing it is more suffused with feeling tone, and may even deteriorate into

those peculiar vocal extravagances in which the Blackcap is liable to indulge under similar circumstances. This disturbance attracts the attention of surrounding species; Blackcaps approach the scene spreading their tails and uttering their call note, Whitethroats flit about adding to the commotion, and an inquisitive Chiff-chaff frequently puts in an appearance. A confused medley of sounds is thus produced and it is usually some minutes before quiet is again restored. Assemblies of males sometimes occur, but less frequently, I think, than in the case of the Blackcap. What the cause of such assemblies may be I cannot tell; the sexual instinct is no doubt responsible in a great measure, but further observation is required to trace out the true meaning. We can only speak with certainty touching the general resemblance of the behaviour to that of the Blackcap under similar circumstances.

The period of sexual activity is productive of much extravagance in their behaviour. Peculiar attitudes are assumed and antics indulged in, the majority of which can be observed with little difficulty, but the degree of extravagance usual in the case of the Blackcap is not attained; the distinct types of attitude are less numerous, though perhaps marked by greater definiteness. In the Blackcap, however, we are taking as a comparison a relatively high level of emotional manifestation, and it is well to bear this in mind. The motor reactions during sexual activity take diversities of form in different species; the wings, tail, and feathers generally are made use of in numerous fashions, yet it is doubtful whether we can speak of any one as exclusively characteristic of this or that species. Indeed it is astonishing how often we find a similar behaviour-response indulged in by widely separate species. A good illustration of this is a performance of the Garden Warbler, which is remarkable for its beauty, and may be likened in some respects to the fluttering of a large moth. Perched upon a branch the bird spreads its tail, flutters its wings so rapidly that the



MALE CARDEN WARBLER

ATTITUDE ASSUMED DURING THE
PERIOD OF SEXUAL ACTIVITY.

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GARDEN WARBLER

outlines become indistinct, and by a rapid sidelong motion of the legs slides gracefully in the direction of the female, uttering a quiet call-note meanwhile. Yet this manifestation, surprising as it is, is not without a parallel in the lives of other species, for both the House Sparrow and Blackbird flutter their wings similarly at a corresponding period, and the Pied Wagtail not only flutters its wings, but, with a similarly rapid motion of its legs, seems to glide this way and that around the female.

After the arrival of a female in a territory, the owner is usually to be found in close proximity to her. Not always, however, for at one moment she wanders outside his accustomed circle and at another he deserts her for a short space of time. But, as a rule, they can be seen together, and their companionship becomes more intimate after the actual construction of the nest has commenced. The three principal factors which evoke emotional response in the male during the period of sexual activity are as follows: the presence of a second male, the presence of an individual of either sex of another species, and the sexual instinct. The first two of these we will discuss later; the third, the sexual instinct, is doubtless indirectly responsible for the first two, but for the moment we will confine ourselves to the manifestations of it when the pairing situation is not complicated by the presence of a third individual. Maximum activity is reached during or just prior to the actual discharge of the sexual function. A partial expansion and slight quivering of the wings and a partial spreading of the tail on the part of the male can frequently be seen, and often occurs when he is above the female, high up perhaps in some tree while she is in the bushes beneath, and is usually the prelude to a pursuit of or a sporting with her. Or, instead of flying directly to her, he may float slowly downwards on outspread wings, singing as he flies. The rapid fluttering of the wings already referred to is the most striking manifestation, and the intensity of this action varies at different times but reaches its maximum

development during coition. That these different actions of the male as well as the various degrees of activity which he exhibits are similar in origin must, I think, be admitted, whether we consider they have a meaning in relation to something in the external environment of the female or not. They indicate that highly excited condition of the nervous system which is the prelude to the actual discharge of the sexual function, and in the gentle quivering or the rapid fluttering of the wings we are but observing different stages in the sexual process. There is a tendency, generally speaking, for the intensity of the activity feelings to increase gradually until the culmination is reached, the final effort being productive of the most violent motor reactions, and, judging by behaviour, the first appearance of a female does not necessarily evoke the pairing hunger of the male in the highest degree. Some definite stage of development of the ovaries may be necessary before the female can adequately stimulate the sexual response of the male. Of the attitudes assumed by the female at this period there is little to be said, a partial spreading of the wings in sympathy with the excitement of the male being all that I have definitely observed.

On frequent occasions excitement is shown by the male, when in the presence or proximity of the female, by an excessive use of his vocal powers, and in most instances the cause can be traced to the presence of an intruding male or an individual of another species; yet there are times when he is alone with her and yet warbles excitedly for a few moments in succession, and even picks up and carries decayed vegetation of some description. Concerning the song at this period, the most noticeable feature is its gradual decrease after the appearance of a female. Previous to this the male sings incessantly, usually from some tree or group of trees prominent in his territory; but this phase of his behaviour undergoes a distinct change upon her arrival. Periods of greater or less duration are then passed in complete silence, and it is difficult to resist the conclusion that his comparative silence is in some



FEMALE GARDEN WARBLER

ATTITUDE ASSUMED DURING THE
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way related to her presence. He shares this peculiarity with other species. In the life of the Willow Warbler I expressed an opinion as to the exact relation the song may bear to the presence of the female, and I believe that the explanation there suggested holds good in this instance. Now the behaviour of certain males during the first half of July is similar to that which we can observe at the commencement of the breeding season. It is difficult to trace the origin of such behaviour; it may be due to a recurrence of sexual activity before a second brood, or perhaps to a specially late arrival of some individuals. Objection can be raised to either assumption. Though a second brood may be reared if the first attempt has proved abortive, yet it is doubtful whether such a proceeding is normal in the sexual life of the species. On the other hand, is it likely that males can arrive so late as the latter part of June and only then commence the task of reproduction? There is something to be said for this. On more than one occasion I have noticed about the third week in June an influx of individuals, belonging to various species, brilliant in plumage and bearing no trace of wear or conjugation. But, whatever the explanation may be, the behaviour without a doubt takes its root in the sexual instinct—the attitudes betoken nothing if not sexual desire—and I am inclined to think that it could be described as even more suffused with feeling tone than is customary earlier in the season. At this period the male commences to sing about three o'clock in the morning; he does not, however, burst forthwith into a full flood of song, but warbles for a short space, then lapses into silence, repeating the process with a gradual lengthening of the singing period. Within his territory he wanders from tree to tree and sometimes floats from one tree to another on outspread wings, warbling as he flies, and upon the female uttering a call note in the bushes beneath, he flies or rather floats down to her and commences to warble excitedly, she, on her part, producing a quiet purring sound. After a short time he flies up to the trees, then again

down to her, and sometimes when very close warbles so quietly that the sound is scarcely audible a few paces away. During these scenes she may flap her wings whilst perched upon a branch, but more usually betrays her emotion by restless behaviour and by uttering various call notes. The presence of a third male evokes much excitement, the owner of the territory spreading and flirting his tail and even flying at the intruder. All this behaviour is clearly but a repetition of that which occurred earlier in the season, and my sole reason for repeating so much of what has already been described is to call attention to the lateness of the date, which requires some explanation.

An interesting feature of the period of sexual activity is the attitude adopted by the bird towards other species, more especially towards the Blackcap, to which it is closely related. It is the male who more frequently betrays emotion in the presence of a member of another species. Much excitement is caused by the intrusion of a Blackcap, and, in a lesser degree, of a Whitethroat or a pair of Whitethroats, in his territory, and the scenes which ensue remind one forcibly of those which result from the intrusion of a neighbouring male of his own species. We listen to a similarly violent use of the vocal powers into which is infused much feeling tone; we see similar pursuits taking place, culminating in a flying together with snapping of bills, and observe similar excitement reflexes. What is the biological significance of such behaviour? If it has no meaning, but is only a manifestation of surplus energy, then it must clearly be included in the category of "play." But in observing the birds under these peculiar circumstances, one is impressed with the persistent striving towards some end which is the accompaniment of such behaviour, and we cannot regard as meaningless behaviour which is so frequent in occurrence, so suffused with feeling tone, and so productive of motor reactions which are customarily associated with feelings of displeasure. What then can the meaning be? Surely the fact that it is a closely related form that is the



MALE GARDEN WARBLER

ATTITUDE ASSUMED DURING THE
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source of irritation, and that the behaviour thereby falls into line with that which is commonplace in the lives of other species, is not without significance. Instances of such antagonism have already been referred to. Whenever two closely allied forms, requiring similar conditions of existence, come into touch with one another, there we so often find evidence of the inevitable struggle for existence. We are thus led back to the question of breeding territory. The Garden Warbler and the Blackcap inhabit a similar environment, require similar food, and, like the Willow Warbler and Chiff-chaff, probably compete with one another; for where both species are abundant, conditions must at one time or another arise which will give a slight advantage to the one that through superiority in some direction is better able to ensure an adequate supply of food for its offspring. I believe, therefore, that these scenes which we witness are but the expression points of this struggle for territory, and further that we can explain in the same way those violent outbursts of song which are coincident with the other manifestations of excitement, and are often the prelude to a conflict. The violent use of the vocal powers when the Garden Warbler and Blackcap come into contact with one another is sometimes ascribed to a cause other than that which we are here suggesting; the song itself is regarded as the principal feature, and an appreciation of their vocal powers by the birds as the stimulus to the outburst. But if song has a meaning in relation to the question of territory, we have in this fact a more simple explanation, the term "song" being held of course to include sounds of all descriptions produced under these peculiar circumstances. From the biological standpoint, there is no difference between the monotonous call uttered by the Green Woodpecker whilst occupying his special tree morning after morning, and the passionate but beautiful outburst of the Blackcap. The song is only one of a series of activities which work towards the goal of reproduction. Through it the females are enabled to recognize and locate

the exact position of those males that have, on the average, passed the test of fitness; without it the males would have no means of proclaiming the fact that they possessed territories, and would be in well-nigh as hopeless a position, so far as reproduction were concerned, as those which lacked the necessary qualifications for securing a territory. It must therefore be regarded as one link in a chain of events, and we must be careful not to fix our attention on it alone to the exclusion of the remainder with which it seems so clearly to be connected. This seems to me to have been done in certain interpretations, wherein it is made to play a part independently of accompanying behaviour. Such interpretations fail, however, to carry conviction when the attempt is made to explain the presence of vocal extravagances, excessive motor reactions, and the law of battle in one and the same individual.

Although the nest is usually commenced soon after the arrival of a female in a territory, yet much variation can be observed in this respect in the case of different individual pairs. Thus one female will lay the foundations of her nursery three or four days after she arrives, whereas another will delay for a week or so. The later females seem eager to commence the construction of their nests, the earlier arrivals less anxious to do so. The actual task of building is left in a great measure to the female, and she sometimes shows hesitation at the commencement as to the choice of a suitable position; a few pieces of decayed vegetation are laid crosswise here, a flimsy foundation is constructed there, and then she transfers her attention to another bush before setting to work in earnest. I cannot recollect finding more than one or two of these initial attempts in the case of the same individual in the same season, but a few pieces of dead herbage loosely crossed might easily escape detection. These unsuccessful attempts at construction are not confined to this one species; they are a peculiarity of others, and I am aware of no interpretation which adequately explains them. Such flimsy platforms do

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not bear the stamp of genuine effort; perhaps they are but excesses of the irresistible impulse which must clearly dominate the situation at that time. The male probably aids his mate in her work, though I have not actually seen him doing so; he at least keeps a close attendance upon her and a careful watch on all her movements, never deserting her for long and apparently only too anxious to return to her when summoned. Whilst following her he may warble for a few moments, and sometimes a quiet purring note is uttered by both sexes; but during this time individuals of other species who approach the scene of operations too closely are flown at and attacked. Two or three days are sufficient for the completion of the nest, which is by no means an elaborate piece of architecture; flimsy it is in appearance and circular in shape, the exterior and foundation being composed of dead grasses rudely bent and entwined, and the interior of grasses of a finer type. The lining, which covers the foundation and reaches some distance up the walls, is composed of fine roots. In appearance the foundation is the most delicately constructed portion, and one wonders how it can be of sufficient strength to support the young. In circumference the nest is approximately from 13" to 15", the external diameter about $4\frac{1}{2}$ ", and the internal from 2" to $2\frac{1}{2}$ ". The walls vary in thickness even in the same nest; thus in one part they may be 1" full, whereas in another about $\frac{1}{2}$ " only. One peculiar variation I have in my possession. It has the appearance of—and I believe actually is—two nests in one. The external depth is 5" as against the customary 2", the internal depth 2", and the circumference rather above the average. The most interesting feature, however, about this nest is the remarkable resemblance it bears to one type of nest of the Marsh Warbler. It is composed of similar materials, is similar in shape, and, more curious still, similarly slung from the surrounding twigs by basket handles. It was situated in a dense mass of dogwood, and coming upon it whilst searching for the nest of a Marsh Warbler, I was

momentarily deceived by its appearance, and but for the eggs should have thought that the object of my search had been achieved. Usually the nest is situated from two to four feet above the ground, and it may be placed in any convenient shelter such as bramble, dead bracken, elder and hazel bushes, no partiality being shown for any particular kind of undergrowth.

From four to five eggs represent the normal clutch, and on the average one egg is laid every twenty-four hours. Whether the male shares the duties of incubation with the female I cannot say, but it is probable that he does so. His song, which had decreased to so large an extent during the period of sexual activity, can now be heard more frequently. The behaviour of the female when disturbed from her nest deserves some attention. When one approaches the nest or the young of the Blackcap too closely the parent or parents become excited and manifest by their actions the intensity of the emotion which is aroused. Now the Garden Warbler is closely related to the Blackcap, and although the instincts of the two species are, generally speaking, uniformly alike, yet, as we have already seen, the emotional behaviour during sexual activity differs both in regard to type and tone. This difference extends to the emotion which accompanies the parental instinct. It is by no means easy to evoke emotional response in the Garden Warbler; approach the nest quietly, awake the bird rudely to the danger which threatens, and the result is in most cases similar; it hurriedly deserts and in a few moments is flitting uneasily amongst the surrounding branches. Sometimes it flutters away and slowly moves its partially expanded wings, and at other times responds more actively by spreading its tail and rapidly fluttering its wings. At no time, however, have I observed its response approach the degree attained by the Blackcap under similar circumstances, nor have I been successful in making it flutter about the ground after the manner of that species. The same individual does not always behave simi-

larly; we observe an active response on one occasion and are surprised to find an absence of response on another; there is no uniformity of behaviour in this respect. When the motor reactions are excessive and much suffused with feeling tone, we rarely find occasions when the usual stimulus will not produce the customary active response, but when the emotional behaviour as a whole does not occupy so high a level of development such occasions are by no means uncommon, and it is therefore not always easy to decide as to the extent of the variation between one individual and another.

The young are hatched in about twelve days and remain in the nest from nine to ten days. They are naked at birth and have their eyelids sealed. The colour of the inside of the mouth is pink, and two dark-coloured spots are conspicuous at the base of the tongue. On the third day their eyes are open and the primaries are then just appearing, and on the fourth day the feathers on the back appear, the primaries being $\frac{1}{4}$ " in length. Between the fourth and fifth days considerable advance is made in their growth and the quills can be seen on all the feather tracts. On the sixth day feathers appear on the breast and flanks, and between the sixth and seventh days another considerable change is noticeable, as all the feathers begin to show colour. During the remaining two days or so growth continues rapidly, but nevertheless they finally leave the nest in what seems to be a very undeveloped state considering the dangers that threaten them. The thick tangled undergrowth, in which they so successfully conceal themselves, secures them no doubt from certain enemies, though at the same time increasing the risk from others. The smaller rodents which abound in such places must make havoc amongst such helpless victims. At this stage the young sit singly or together on the smaller branches of some thick bush and utter periodically a faint note which is difficult enough to hear but still more difficult to locate. This note acts as a guide to the

parents, who are then indefatigable in searching for food and keeping them fully supplied.

Whilst the young are actually in the nest, the parents share in the task of securing food and cleaning the nest, and both are suspicious and create considerable commotion if the nest is approached too closely. Their suspicions, however, can be allayed to some extent by patience, but no matter how quiet one is, or how well concealed one appears to be, they never seem quite to overcome their shyness, and consequently their behaviour is strained and they either hesitate at the last moment or divide the food very hurriedly amongst their offspring. Of the two, the male is perhaps the more courageous until his suspicions are thoroughly aroused, when he appears to find greater difficulty than his mate in recovering his natural composure. When the nest is first approached, the bird that is brooding or tending the offspring commences to utter the peculiarly harsh note of the species; its mate then hurriedly approaches the scene, and the combined vocal efforts of the two produce a commotion which is somewhat unusual in the bird life of the neighbourhood. Individuals belonging to other species approach the scene of disturbance, Redbreasts, Whitethroats, Chiff-chaffs, Blackcaps, and even other Garden Warblers quietly draw near and flit amongst the surrounding branches. Some add to the commotion by their own vocal efforts, others are silent, but it is usually a considerable time before quiet is again restored. So long as the intruder remains by the nest the commotion is liable to recur, stimulated by the harsh alarm note of the parents, and in this respect they differ from many species which, when once their alarm has subsided, proceed naturally with their instinctive routine of activities. Even whilst carrying a full supply of food they may utter their alarm note until they approach to within a few yards of the nest, when it is replaced by a purring sound which is replied to by the young. Both parents share in the brooding of the young, and the one leaves the nest in reply to a note uttered by its partner. When the young are

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just hatched, brooding occupies a considerable part of the parents' time, but as they increase in growth so it becomes of less importance. Apparently there is no order in the feeding of the young, as a rule the more persistent obtain the larger share of the food. Their activity is probably proportionate to their hunger, and the one that is the more active in stretching up its neck is the more likely to secure the food. Sometimes one, or perhaps two of the brood receive an unequal share, and I watched an individual on one occasion secure the food ten times in succession. The parent may place the food in the throat of one of the offspring, withdraw it in a few seconds, and finally replace it or even transfer it to another individual. In a case of this description there is generally some hesitation on the part of the young bird in swallowing, due perhaps to the fact that it does not really require the food; and to the keen perceptual powers of the parent the absence of the proper muscular movements involved may be a guide as to its own further behaviour. Inasmuch as the suspicion of the birds never seems to be wholly allayed so long as one remains sufficiently near the nest to observe their behaviour, it may be contended that the unequal distribution of the food is an unnatural proceeding brought about by abnormal circumstances. If the method here referred to were peculiar to this one species, I should be inclined to grant this probability, but, far from being peculiar, it is the usual procedure adopted by other species, some of which are not suspicious whilst carrying out their routine of activities in the presence of an onlooker. Again and again one can observe the more persistent individual receive the larger share of the food, and one can notice that the persistency with which it stretches out its neck and struggles in the direction of the parent is in accordance with the length of time it had previously been without food. The faeces are carried away and dropped some distance from the nest.

Concerning the song, there is not very much to be said.

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Though by no means so finished a songster as the Blackcap, the bird nevertheless owns a beautiful warble, with which fault can only be found on the score of monotony. There is little range of tone in the song, none of those remarkable, almost passionate, variations which indicate great vocal development, and, so far as I can discover, very little tendency to imitate the sounds produced by other species. The ordinary call note is a single harsh note uttered slowly or rapidly according to the emotional state of the bird, and is similar, or nearly so, in both sexes. In addition to this note there is the quiet "purring" of sexual or parental emotion. The note of the young is somewhat similar to that of the young of the Blackcap, but impossible to describe.

The food consists principally of insects, green larvæ forming the staple diet of the young; on one occasion I observed some individuals early in the season feeding upon the young shoots of the common Norway spruce. Fruit also is not refused when the opportunity for securing it arises, and in the autumn large quantities of elder berries are consumed.



MALE, GARDEN WARBLER
ATTITUDE ASSUMED DURING THE
PERIOD OF SEXUAL ACTIVITY.

SWAN ELECTRIC MFG. CO.

THE UNIVERSITY OF CHICAGO



BARRED WARBLER.

Sylvia nisoria, *Dresser, Birds of Europe*, vol. ii, pp. 435-438, pl. 68 (coloured figures of adult male and young female), 1874; *Seebohm, British Birds*, vol. i, pp. 387-389, pl. 10, fig. 1 (egg), 1883; *Lilford, Coloured Figures*, vol. iii, p. 60, pl. 30 (coloured figures of adults), 1890; *Saunders, Manual of British Birds*, 2nd Ed., pp. 51-52 (woodcut), 1897.

French, *Fauvette épervière*; German, *Sperber-Grasmücke*; Hungarian, *Sávós poszdta*; Italian, *Calega padovana*; Russian, *Slavka pestrogradza*; Swedish, *Hökfågad*.

DESCRIPTION OF THE PLUMAGE.

Adult Male in Spring.—The upper parts are brownish grey, rather more ash colour on the crown, rump, and upper tail-coverts. The feathers on the forehead and shoulders and the upper tail-coverts have a narrow light tip bordered with a narrow darker bar which gives to these parts a barred appearance. The flight feathers are brown, narrowly edged with whitish brown, the larger wing-coverts and innermost secondaries being tipped with white; this pattern on the secondaries, wing-coverts, and median wing-coverts forms two distinct whitish bars on the closed wing. The smaller wing-coverts are brownish grey like the back, the pattern described above being scarcely discernible, the bastard wing is dark brown edged with white, and the primary coverts brown, narrowly edged with light brown. The tail feathers are ash grey, the outermost having a narrow white edge with a conspicuous wedge-shaped white spot on the inner web, and the shafts are reddish brown. The lores are dark grey and the ear-coverts the same colour as the crown. The underparts are whitish, each feather having a dark greyish brown bar near the end which gives the crop and flanks a barred appearance. The abdomen proper is almost uniformly white. The under tail-coverts are light brown broadly tipped with white, and

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the underside of the tail grey. The lesser under wing-coverts are white, barred with brown at the end, and the axillaries white, washed with light ochre and indistinctly barred. The bill is horn brown, the base of the lower mandible being yellowish flesh colour, and the iris bright yellow. Feet are light greyish brown with pale flesh-coloured soles.

Adult Female in Spring.—The general colour of the upper parts is very similar to that which we find in the male, but rather more brownish, the ash colour on the crown, rump, and upper tail-coverts being scarcely conspicuous. The under parts are almost white, slightly washed with light ochre, and with a suggestion of the barred pattern found in the male. The abdomen is pure white.

Immature.—The general colour is lighter and greyer than that of the adult in spring, with but a trace of the pattern. The underparts are white, washed with light rusty grey on the upper breast and flanks, the barred pattern being occasionally suggested. Iris is sulphur yellow. Feet lead colour with yellowish soles.

GEOGRAPHICAL DISTRIBUTION.

From time to time a number of examples of this species have been met with in **Great Britain** and **Ireland**, the records coming from Kent, Norfolk, Lincolnshire, Cambridgeshire, Yorkshire, Oxfordshire, Lancashire, Anglesey, the Isle of Man, the Isle of Skye, Argyll, the Outer Hebrides, Shetland, Fair Isle and St. Kilda, and in Ireland from Belmullet and Rockabill Light.

To the western parts of **Europe** the bird is a scarce visitor, but in **Germany**, though local and rarer in the west, it is, nevertheless, generally distributed, and especially common in the eastern provinces, and northwards is found breeding in **Denmark** and the southern parts of **Sweden**. In the northern provinces of **Italy** it is found in suitable localities, but is of rare occurrence in the central and

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southern parts. As a breeding species it is common in Austria, Hungary, Bulgaria, Dalmatia, Montenegro and the Dobrudscha, and the same may be said of the greater part of European Russia, where its range extends from the southern shores of the Gulf of Finland, throughout the Baltic Provinces, Poland, the central and southern provinces and eastwards to the Ural District. There are records of its occurrence also from Transcaucasia, and a closely allied race is found in western Siberia and Turkestan.

It winters in North-Eastern Africa.

SUBALPINE WARBLER.

Sylvia subalpina, *Dresser, Birds of Europe*, vol. ii, pp. 389-392, pl. 59 (coloured figures of adults), 1875; *Saunders, Manual of British Birds*, 2nd Ed., pp. 53-54 (woodcut), 1897.

DESCRIPTION OF THE PLUMAGE.

Adult Male in Spring.—The upper parts are pure ash grey, faintly washed with brown on the mantle, rump and upper tail-coverts. The wing feathers are earth brown, the innermost secondaries and their coverts being broadly and the remainder narrowly edged with brownish white, and the bastard wing is dark brown externally, edged with whitish. The upper side of the tail is dark brownish grey, the feathers being edged with light brown. The outer web and tip of the inner web of the outermost tail-feathers are white, whereas the inner web of the second feathers has only a wedge-shaped white spot at the tip. The lores are ashy grey, slightly darker than the crown, ear coverts ashy brown, and the sides of the neck ashy grey. A white moustache divides the grey from the vinous coloured throat, and the latter colour extends down the underparts and flanks, leaving the abdomen white. The under tail-coverts are whitish washed with pale vinous near the roots. The underside of the tail is dark ashy grey, the shafts of the feathers being white, the underpart of the wing grey, and the under wing-coverts and axillaries pale rusty brown. The bill is dark brown, the base of the lower mandible being brownish flesh colour, and the iris yellowish brown surrounded by a maroon red ring. The feet are reddish flesh colour.

Adult Female in Spring.—All the upper parts, including the lores and ear coverts, are brownish ash grey, but the forehead is more ochre. The wings and tail are rather lighter in colour than the corresponding parts of the male and the white

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stripe is not so conspicuous. The underparts are whitish more or less suffused with vinous on the throat and light buff on the upper breast, flanks, and roots of the under tail-coverts. The abdomen is white and the under side of the wings and tail as in the male. The colour of the iris, bill, and feet is similar in both sexes.

GEOGRAPHICAL DISTRIBUTION.

There are only two records of the occurrence of this southern species in **Great Britain**, one from St. Kilda and the other from Fair Isle. It has occurred in **Switzerland**, but in Europe its breeding range includes **Spain**, **Portugal**, the south-eastern parts of **France**, **Italy**, **Sicily**, **Sardinia**, **Corsica**, **Dalmatia**, **Croatia**, **Bosnia**, **Montenegro**, **Herzegovina**, **Bulgaria**, **Turkey**, **Greece**, the **Ionian Islands**, and the **Archipelago**. It also inhabits **Asia Minor** and **Cyprus**, and has been observed in **Palestine**. As a breeding species it appears also to be common in **Morocco**, **Algeria**, **Tunis**, and **Tripoli**, and passes through **Egypt** on migration. Probably the North-West African and the West Mediterranean birds are resident, but very little appears to be known of its winter quarters beyond the fact of its migrating in numbers through **Algeria** and **Tunisia**, and having occurred in **Somaliland**, **Arabia**, and **German East Africa**. So that apparently the birds from the **Balkan Peninsula**, **Asia Minor**, &c., are regular migrants.

Slight subspecific differences are noted between birds from (1) South-west Europe and West Mediterranean; (2) North-west Africa; and (3) South-east Europe, **Asia Minor**, and East Mediterranean.



THE YELLOWTHROAT

WOOD WARBLER.

Sylvia sibilatrix, Meyer, *British Birds*, Folio Ed., vol. i, pl. 69 (coloured figure of adult and egg) [1835-43] ; Hewitson, *British Oology*, 1st Ed., vol. i, pl. 118, fig. 3 (egg), 1837 ; *id.*, *Eggs of British Birds*, 2nd Ed., vol. i, pp. 99-100, pl. 28, fig. (egg), 1846 ; *id.*, *id.*, 3rd Ed., vol. i, pp. 135-136, pl. 36, fig. 3 (egg), 1856.

Phyllopneuste sylvicola, Macgillivray, *British Birds*, vol. ii, pp. 364-370 (woodcut of head), 1839.

Phyllopneuste sibilatrix, Gould, *Birds of Great Britain*, vol. ii, 2 pp., pl. 67 (coloured figures of adults), 1862.

Phylloscopus sibilatrix, Yarrell, *British Birds*, 4th Ed., vol. i, edited by Newton, vol. i, pp. 427-431 (woodcuts of bird and nest), 1873 ; Dresser, *Birds of Europe*, vol. ii, pp. 497-501, pl. 77, fig. 2 (coloured figure of adult male), 1876 ; Booth, *Rough Notes*, vol. ii, pp. 57-58, 1883 ; Seebohm, *British Birds*, vol. i, pp. 426-429, pl. 10, fig. 12 (egg), 1883 ; Lilford, *Coloured Figures*, vol. iii, p. 62, pl. 31 (coloured figure of adult male), 1886 ; Saunders, *Manual of British Birds*, 2nd Ed., pp. 71-72 (woodcut), 1897.

Danish, *Grönsanger* ; Dutch, *Fluiter* ; French, *Bec-fin siffleur* ; German, *Wald-Laubvogel* ; Hungarian, *Zöld Rendike* ; Italian, *Lui verde* ; Russian, *Pienka* ; Spanish, *Mosqueta* ; Swedish, *Gronsångare*.

DESCRIPTION OF THE PLUMAGE.

Adult Male in Spring.—The upper parts generally are greenish yellow, slightly more greyish on the back but more yellow on the rump and upper tail-coverts. The superciliary stripe is bright yellow, lores and upper ear-coverts grey forming a dark streak through the eye, sides of the head and neck olive yellow becoming pure light yellow on the throat and crop, and the rest of the underparts pure white, the flanks being washed with a faint olive yellow. The wings are rather dark greyish brown, the outer edges of the innermost secondaries being broadly edged with light greyish yellow, while the rest of the flight feathers are narrowly edged with the same colour as the back. The secondary coverts are broadly edged with

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the greenish yellow of the upper parts and the smaller wing-coverts are a similar colour, whereas the bastard wing is greyish brown. The tail feathers are greyish brown edged with the same colour as the rump and upper tail-coverts, the shafts being dark reddish brown, and the under surface of the tail and wing feathers is grey narrowly edged with greyish white. The outer edge of the anterior part of the underside of the wing is brownish grey, the feathers having light yellow edges, the smaller wing-coverts are white and the axillaries light yellow. The bill is brown, the colour being of a lighter shade on the edges and at the base of the lower mandible, iris is dark brown, feet fleshy brown, and the soles olive yellow.

The colouring of the female is similar to that of the male but not so bright.

Immature.—The upper parts are slightly lighter and more olive yellow than in the case of the adult in spring, the yellow parts of the head and throat less brilliant, but the underparts similar.

Nestling.—The general colour is similar to that of the adult in spring but brighter. The upper parts incline towards grass green, the yellow throat and upper breast are deep sulphur yellow, and the superciliary stripe is very conspicuous. The innermost secondaries are broadly margined with light yellow, the whole of the underparts and under tail-coverts being pure white. Upper mandible is horn brown and the lower yellowish flesh colour.

GEOGRAPHICAL DISTRIBUTION.

It is found breeding in suitable localities throughout England and Wales, except in the west of Cornwall and Pembrokeshire, but is thinly distributed in Scotland, only being common in parts of the Clyde area and not breeding north of Loch Broom on the west side, though it has

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been recorded from Fair Isle and Sule Skerry on migration. In Ireland it is rare and local, nesting only in Galway, Queen's Co. and Wicklow.

In Spain it seems to be a rare breeding species, only recorded as nesting in the extreme south, though, as usual, the information from that part of Europe is meagre. From France, Belgium, Germany, the Austro-Hungarian Monarchy, and Switzerland, there is ample evidence of its general distribution, but in Italy it is not a very common breeding species, more numerous, however, in the central and northern parts, and rare in Sardinia and Corsica. Heligoland is visited on migration, though the bird does not appear to pass or rather to rest upon this island so frequently as one might expect. It occurs in Denmark and the lower part of Sweden, but not apparently in Norway. Greece is passed on migration, but its status in Turkey and Bulgaria has not been satisfactorily determined. Throughout Poland, the Baltic Provinces, and Central Russia generally as far as the River Volga it is generally distributed, but to the south it seems to be a bird of passage only, though the data from the provinces round the Black Sea and from the Caucasus are not very satisfactory. Returning to the north we find it not uncommon in Finland as far as Kuopio, which is perhaps its northernmost limit, a summer visitor to the province of Vologda, rare, however, in the vicinity of Archangel, and occurring, though rarely, on the south-western slopes of the Ural Mountains. There are records of its breeding near the town of Orenburg. It is apparently present in N. Algeria in the breeding season, but has not yet been proved to breed there.

On migration it is found in Asia Minor, Cyprus, Palestine, Arabia, and Egypt, and also in Madeira on the west side. The bird winters in Africa, its migrations extending to the Gold Coast, the Congo, and Abyssinia.

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LIFE HISTORY.

The Wood Warbler reaches Worcestershire considerably later than either the Willow Warbler or the Chiff-chaff, and it is of little use searching for the bird in that county before the last week in April, or, in some seasons, the first week in May. Mr. Eagle Clarke gives April 12th as the usual date of the first arrival in England, and April 25th in Scotland, the latter date being approximately the date of the first arrivals in Worcestershire. The period of arrival is spread over some weeks, just as it is in the case of other migrants; the woods which the birds are accustomed to inhabit do not suddenly become occupied by these little travellers, but are slowly filled, first in one corner, and then in another. The females commence to arrive a week or ten days after the first males, and they too come by slow degrees, this male receiving a partner to-day, that one to-morrow, and so on for a week or perhaps a fortnight.

As its name suggests, the Wood Warbler is a true occupant of woods, and whether such woods are large or small matters but little so long as the environment is in other ways suitable. Wooded banks or hills, such as are found in many parts of Wales, seem to be a favourite breeding resort, although woods which have nothing undulatory about them are also frequented. The bird is often spoken of as being especially fond of oak and beech woods, which is true enough in its way, but it is not so much a question of the kind of tree as of the nature of the ground beneath. Thick tangled undergrowth is clearly unsuitable so far as its nesting requirements are concerned, and that, I take it, is the reason of its partiality for oak or beech woods, since the undergrowth is there generally scanty, the ground being carpeted with nothing but moss and decayed leaves. Those who read the history of the Willow Warbler may perhaps remember that this question of environment was alluded to, and some remarks added on the probable effect of the felling of timber or the destruction otherwise of a breeding station. I had an interesting experience with

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some Wood Warblers in this connection. The timber was felled and the undergrowth cleared in a wood of some hundred acres in extent, which for many years previously had been left untouched. In the following season, amongst other warblers which now found therein a congenial home, some Wood Warblers appeared, and each in due time secured a female, and I believe reared their young successfully. The next year two males appeared on May 3rd, and on the morning of that date were decidedly hostile to one another, but on May 4th and 5th there was no sign of these two males, nor were there any fresh arrivals. On May 6th two males again appeared and were unusually restless in their behaviour, wandering from place to place, and when in the same neighbourhood attacking one another. On May 7th one bird only was singing, and again on May 8th, but on this latter date the second male was again in evidence pursuing individuals of other species in his immediate vicinity. After this date these two males vanished, and there was no further sign of the species in the wood that year, nor did any individuals remain to breed in the following season. The behaviour of these two males differed in one important particular from the normal behaviour of the species: they were restless; instead of roaming about within the precincts of a territory, they extended their wanderings, first in one direction, then in another, and even went so far as to seek a resting place in the opposite end of this large piece of woodland. Something was evidently amiss; a check had somehow been imposed upon the normal routine of instinctive activity, and it is my belief that the birds deserted the wood owing to its having become unsuitable so far as reproduction was concerned. The previous season they were there, content to remain in their territories and await the advent of the females, but a change had since taken place in the character of the wood, the open leaf-covered spaces, which could afford the necessary shelter for the nest, were gradually being swallowed up in a jungle of undergrowth, and the birds could not do otherwise than retire if they were to

have an average chance of rearing offspring. There were, moreover, no females present; the responsibility for deserting the wood rested solely with the males who had preceded them, a fact which is of some importance, for the males take little if any share in the actual construction of the nest. How then was their decision arrived at? The question in this form savours too much perhaps of human process; let us therefore ask how the instinctive routine of activity was interrupted. Now it is probable that these males were either the same individuals, or the offspring of such, that nested in the wood the previous season, for instead of passing directly through it, as is customary with birds in search of new breeding grounds, they wandered restlessly about for some days before leaving, evidently expecting to find suitable territories. Hitherto the environment had answered their requirements, and the true course of their instinctive procedure therefore ran smoothly, but they were now called upon to face an experience which in all probability they had never met with before. I cannot, of course, prove that they had never been called upon to face this particular phase of experience, but bearing in mind the conditions of existence of these smaller migrants and the fact that this wood had only been inhabited by this species for the two previous seasons, it is not, I think, unreasonable to assume that some at least of these males had had no experience, so far as reproduction was concerned, beyond that which was supplied in those hundred odd acres. I am trying to show that for one or the other, or perhaps all, of these males, the environment could scarcely have acquired meaning as the outcome of previous experience, and that we cannot well call to our aid "meaning" in explanation of their behaviour. So that we are compelled to fall back upon racial preparation through the natural selection of variations of germinal origin, which is little enough help, for it is one thing to show how the reproductive instincts of this or that species have conformed to this or that environment through the elimination of the

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failures, and quite another to show how the environment can come to possess guiding value for a bird as to its future behaviour. Assuming that the facts are correct, science, I take it, has really no explanation to offer.¹

The males, when they first arrive, are often more restless and cover a larger area of ground in their wanderings than they are wont to do a few days later. Even upon the first morning of their arrival they do not roam far, but confine themselves rather to that particular part of the wood in which they have settled; afterwards their wanderings become even more curtailed, and the week or so of their bachelor existence is usually passed amongst certain trees on a few acres only of ground. Consequently they own territories after the manner of other species, territories which of course vary in extent according to the nature of the environment and the proximity of rival males, but which, on the whole, are very similar in size to those of the Willow Warbler or Chiff-chaff. One curious departure from the normal routine of behaviour in regard to this question of territory came under my notice. A male that owned a territory in one corner of a large wood was wont to disappear from view for short periods of time. Located in the same wood were a few individuals of the same species, the nearest of which possessed a territory some 250 yards away. In order to solve the difficulty of the alternate presence and absence of this particular male I determined to keep him strictly in view for a time, and it soon became evident that he and the neighbouring male referred to were one and the same individual. He therefore owned two territories, in each of which he spent a portion of his time. Unfortunately I was compelled to desert him before any females had arrived, and was unable consequently to see the outcome of his peculiar behaviour. The intermediate

¹ On the hypothesis of germinal variation in every direction, acquired modification may here have determined the survival of variations in the direction of a more complete harmony with the environment in the way suggested by Professor Lloyd Morgan in his principle of the survival of coincident variations.

ground between the two territories was, so far as one could judge, suitable in every respect for nesting purposes, yet it was passed over in rapid flight.

The daily routine of a male before the arrival of a female is simple enough, most of his time being spent in fluttering backwards and forwards between two particular trees. The males of many species have a peculiar flight of their own during the period of sexual activity, which alone makes recognition possible, and the male Wood Warbler must be reckoned amongst this number, for his slow progress between two favourite points, accomplished by moderately quick though short beats of the wings, is strongly characteristic of the species. The two other species—the Willow Warbler and Chiff-chaff, which we know well in this country, and to which the Wood Warbler is closely related—have no flight exactly comparable with this; but just as they have some special tree, or group of trees, which they make use of more frequently than another, and seem to regard as a headquarters, so this bird has two separate points with a highway connecting them. The song too forms an important part of this particular aspect of behaviour, since at no other time is it uttered so frequently or so regularly. But we do not find the bird always thus employed. There are periods of varying lengths when it is engaged in searching for food high up in the tree tops or low down amongst the bushes, and it is just at these times that it roams farthest from its central position, and, journeying thus, forms a habit which justifies the application of the term "boundary" to the normal limit of its wanderings. In the districts in which my observations have been made, the birds are plentiful enough, though not nearly so numerous as the Willow Warbler or Chiff-chaff; so that the conditions which lead to overcrowding and competition have never been very present to my experience. I have never, that is to say, witnessed much rivalry between different individual males, but sufficient all the same to show that they are just as anxious to defend

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their territories from intrusion as the males of many another species. Conflicts occur both before and after the arrival of the females, and have their origin, I believe, in the question of territory; they take the form of a flying at and rapid pursuit of one another, and are more frequent after a female does arrive in a territory, possibly because the neighbouring males, if still in bachelorhood, find it then difficult to resist their natural inclination to approach her closely. I have already called attention to the struggles between the males of closely allied species regarding the question of territory, and it is necessary to refer to them again in connection with this species. The term, "struggle for existence," is held to embrace every adverse influence that an organism has to face; it does not necessarily imply an actual trial of strength between species and species, though it is always supposed that such does actually occur. But to obtain evidence by direct observation is no easy matter. We are apt to forget that processes in Nature, even those which in time lead to great results, work very gradually, and that all the evidence we can ever hope to obtain of some change in progress is supplied in just those details which in themselves appear to be of trifling importance. Now in the conflicts between the males of the same and closely allied species we seem to have genuine struggles, which, without any undue stretching of the imagination, may be expected to lead to appreciable changes. Are they, however, really genuine? I ask this question because of statements made, not infrequently, to the effect that combats between rival males are now only formal. It is somewhat difficult to understand what the term "formal" is here held to denote; does it mean that they are not conflicts, or that they are conflicts to which no meaning can be any longer attached? Why should it be thought that the conditions which necessitated a clashing of interests in the past are not present to-day? And what waste of energy if they no longer serve any purpose! For my part I believe that they are very real—the death of

a vanquished male bears at least the impress of reality—though it must be admitted that the quarrels are often of a transitory nature, mere bickerings, a flying at one another followed by a short pursuit and nothing more; yet even so, the end for which the birds are striving is probably attained. The life of the Wood Warbler affords ample evidence of racial warfare, and the Willow Warbler, probably because it is plentiful and inhabits a similar environment, is of all others the one with which its interests seem more frequently to clash. To observe these quarrels it is necessary to keep in close touch with some particular male from the day of its arrival, to learn its daily routine, and at the same time to know something of the habits of the surrounding species; to interpret them is impossible without the initial knowledge thus acquired. Again and again this mutual antipathy between these two species can be observed during the short period in which they are slaves to the reproductive instinct, and I hope I shall not be accused of needless repetition if I suggest that these struggles ensure, to the stronger, reproduction and a full measure of success in the rearing of offspring, and are therefore related to a larger scheme of which they are but the expression points. It is difficult enough to determine by direct observation whether a species is increasing or diminishing in a particular locality, still more difficult to establish any relation between the success of the one and the failure of the other.

Upon the arrival of a female, a considerable change manifests itself in the behaviour of the male. Previous to her appearance on the scene his daily existence was marked with little excitement apart from the quarrels already referred to, but now that is all changed, the sexual instinct asserts itself, and he becomes for a time the slave of the accompanying emotion. The first indication we have of the near approach of conjugation is one which would scarcely seem to portray an increase of excitement, namely, a decrease in the volume of the song. Instead of exercising his vocal

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powers with unwearying zeal hour after hour, he now contents himself with spasmodic outbursts, slovenly executed, a peculiarity which he shares with certain other species. If the arrival of a female were in a preponderating number of cases coincident with a complete cessation of the song, some difficulties that lie in the path of an interpretation of the latter would be cleared away, but unhappily this is not quite an accurate statement of the facts. That a definite change in the song does occur is obvious, a change so pronounced that we can rely upon it as an indication of her presence. The female, though she has no song, is strikingly persistent in uttering her call note, which, loud and clear as it may be, is often difficult enough to locate. Of course she remains more or less within the confines of his territory, but at first not absolutely so, for she may wander into an adjoining one, and thus cause some confusion. The small plot of ground which by force of habit has come to be regarded by him as a headquarters is not necessarily sacred to her; as likely as not she may select for her nest a corner of the territory far removed from this particular spot, or even before the question of a nesting site has become a practical problem she may remain in a part of the territory some distance from his headquarters, and this may lead to interesting behaviour on his part. We have the headquarters on the one hand, and the female on the other, the old influence and the new. Now one would expect to find that the sexual instinct at this particular time would be sufficiently strong to dominate every other influence, but anxious as he is to approach her, he nevertheless seems unwilling at times, even for her sake, to desert his headquarters; to and fro he flies, following and playing with her in one corner, then returning for a while to his special group of trees, where, despite her appeals, he shows anxiety—in fact seems almost compelled to resign himself to his former habit. So here we have a piece of behaviour which, though apparently trifling, yields nevertheless by slow degrees only to the most potent of all instincts, the sexual.

Can we then regard it as a meaningless habit acquired by a male here and a male there during the few days of bachelor life? Surely not, yet it is difficult to indicate the precise meaning that may be attached to it. Sufficient time can scarcely have elapsed in those few days for a habit of such evident strength to have been formed. Possibly it is not a habit in the sense of something acquired, but rather a congenital endowment common to the race, and let us bear in mind that his behaviour is quite in keeping with that which we can observe in the life of many another species. The disposition to favour some special tree or group of trees within the confines of that which we have called a territory and make of it a headquarters, the eagerness with which it is afterwards sought and made use of, and the reluctance with which it is ultimately yielded to the more pressing matters of reproduction, all point to something more than individual fancy, something definite in fact to be attained, for which racial preparation has probably fitted the birds.

In some cases the period between the arrival of a female in a territory and the commencement of the nest is of remarkably short duration, but whether this is the rule or the exception I cannot say with the records of only a few pairs to rely upon. The female may even commence to build upon the day following her arrival, and one wonders why this should not be the invariable procedure, instead of the procrastination so frequently observed, and of which we really have no explanation. The period of sexual activity is productive of much emotional behaviour, which, though it never reaches the degree of extravagance attained by some species, possesses some interesting features to which attention must be called. The climax of this behaviour is reached, as we should expect, during or just prior to the actual discharge of the sexual function, but I do not mean that the final stage is always reached; there is often excitement on the part of one or of perhaps both sexes which clearly does not materialise, why we do not exactly know. If the completion of the sexual act



MALE AND FEMALE WOOD WARBLER

ATTITUDE ASSUMED DURING THE
PERIOD OF SEXUAL ACTIVITY

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WOOD WARBLER

were dependent upon the periodic recurrence of a certain organic condition in both sexes, it is probable that seldom only would it reach its consummation; if, on the other hand, the necessary condition were always present in both sexes, no check would be imposed upon a too liberal yielding to the sexual impulse. In order to overcome this difficulty the sexual instinct is, I believe—though it is a mere supposition on my part—allowed free play in the male, but is subject to some periodicity in the female. Thus she may be said, broadly speaking, to exercise a control, though such control is really biologically determined. During the period of sexual activity the male can usually be found in close proximity to the female. She flutters from branch to branch, he following in her wake, and as they roam thus about the territory in search of food, she calls often and he utters the last sentence of his song occasionally. Outbursts of excitement are of frequent occurrence, and the male generally takes the initiative, but not always, for sometimes the responsibility rests with her, that is to say it is she who suddenly and with but little warning darts off in pursuit. The routine of sexual behaviour does not appear to be similar on every occasion; I am doubtful whether it is always initiated by a pursuit, but it is difficult to speak with certainty upon this point. A mutual pursuit amongst the trees seems, however, to be a necessary part of the routine, and may even occur at the conclusion of the whole process, subsequent that is to say to the completion of the sexual act. The normal procedure is as follows. The male approaches the female, and settling beside her with drooping wings commences to flutter or quiver them rapidly. She may do likewise, whereupon both continue this wing flapping or wing quivering for a period which, though of short duration, varies in length on different occasions. When the proceedings are initiated by a pursuit, the male, previous to darting at her, watches her intently for a few moments, and whilst doing so betrays suppressed excitement, his feathers being tightly compressed and his wings loosely

carried as he bends low upon the branch. During the pursuit a note is uttered which, as far as my experience goes, is peculiar to this particular moment, and after the proceedings have terminated the male shows evident signs of exhaustion, for he remains panting upon a branch with his bill wide open. The whole behaviour is strikingly similar to that of the Willow Warbler at a corresponding period. If there is any distinction between the two sets of behaviour, it must be sought in the degree of expansion of the wings, which after all is little enough, for the quivering may develop into flapping or the flapping subside into quivering; and though experience betrays other differences of minor importance which enable us to distinguish the one bird from the other, yet for purposes of comparison we are justified, I think, in speaking of the behaviour as similar in both cases. There is one other interesting feature. The females of most of the Warblers occasionally assume, during the period of sexual activity, attitudes which are characteristic of the male, but the females of these two species, the Wood and Willow Warbler, are as persistent, or nearly so, in their wing flapping as the males, and not only are their actions similar to those of the male, but there is also a very general resemblance in the intensity of the emotional manifestation.

As far as my experience goes the female completes the nest without assistance from her mate, the work of construction occupying three or perhaps four days, but she does not labour throughout the day, fetching and fixing materials; if she did so the nest would probably be ready to receive the eggs by the evening of the first day. What happens is this, that at certain times she is seized with an impulse, which may last fifteen minutes or more, to build, and during that time she devotes the whole of her energy to the task. Flying backwards and forwards to some spot, a few yards away from the position selected, she carries leaves at one moment, a piece of decayed grass at another, fixes them rapidly,

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and again goes in search of more as if the completion of the nest were a matter of urgent importance. Then she ceases as suddenly as she commenced and for a while neglects her responsibilities. The periods of activity recur at intervals until the nest is completed some four or five days after the foundation is laid, the intermediate time being spent with her mate either in searching for food or in those mutual pursuits and gambols which are probably sexual in origin. When she is actually engaged in her work, the male is usually close at hand uttering his call note or watching her movements from a distance of a few yards only. The nest is similar in type to that of the Chiff-chaff or Willow Warbler, and, as a rule, is well concealed in a wooded bank or in some hollow in the ground. It is oval in shape and constructed principally of decayed grasses and leaves, the foundation and exterior being composed of coarse bladed grass with an admixture of dead leaves and the interior of a finer grass which at the same time constitutes the lining. Amongst the decayed vegetable matter which is utilised we again meet with the bark of the honeysuckle. This bark, as I explained in the life of the Willow Warbler, peels away from the wood of itself and hangs from the branch in long strands which are readily obtained by the bird. So that these three species, the Chiff-chaff, Willow, and Wood Warbler, make use of it for a similar purpose. Some remarks concerning this habit and a confession of ignorance as to its interpretation will be found in the life of the Willow Warbler. Comparing the nest of the Wood Warbler with that of the Chiff-chaff or Willow Warbler we find that there is one essential point in which it differs from theirs, namely, in the lining, which is of fine grass instead of feathers; a detail of minor importance some may say, but all details appear to be of minor importance until we attempt to explain them. When we consider that the environment of the Wood and Willow Warbler is similar, the position of their nest similar and the shape and material of which it is composed similar, while only the lining is

different, the least inquisitive must wish to know what biological significance, if any, can be attached to this fact. If it were not that these two birds happen to live under conditions which are identical in all respects, we should not, I suppose, question the serviceableness of a feather lining; we should dilate at length upon the advantage of warmth to the young when the parents are away in search of food, and probably affirm that a cold breeding season only was required to decimate an imaginary race that had not acquired this method of securing warmth for their offspring.

Six or seven eggs represent the full clutch of the species, though five are sometimes spoken of as the full complement. The number equals, therefore, that of the Willow Warbler, or Chiff-chaff, but slightly exceeds the average of the majority of Warblers. One egg is laid with fair regularity every twenty-four hours until the clutch is completed. I do not know whether the slight excess in the number of eggs laid by these three species bears any relation to the shape of the nest. A covered nest must, one would suppose, be of considerable advantage in preserving the young from exposure, and, by to some extent relieving the parents of the necessity for brooding, enable them to secure food for a larger number of young. The whole problem of the relation between the type of the nest, the number of eggs, and the behaviour of the parents is somewhat intricate. I am taking it for granted that there is some relation—the evidence seems to point in that direction—although it is possible to find plenty of exceptions to any rule we may formulate upon the subject. Incubation lasts approximately twelve days. At birth the young are naked except for a little down, and their eyelids are sealed. No spots are visible at the base of the tongue. When the young are hatched the female betrays considerable anxiety. Flitting from branch to branch she keeps uttering her plaintive note, approaches the nest closely, then retires, and hesitates thus for some time before finally entering. Of emotional behaviour when she is frightened off her nest, there seems to be little

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enough; a slight spreading of the wings and fluttering along the ground, but nothing more; nothing, in fact, that could not be described as a natural retreat. It is possible, however, that the emotional behaviour at this special time may exceed that which I have hitherto observed, as it must be apparent that my knowledge of the behaviour of the birds during this period is exceedingly scanty.

The male may almost be said to own two songs. The one by which he is usually recognised consists of a single note uttered more and more rapidly in a slightly descending scale until it culminates in a rapid trill; the other, which is heard less frequently, consists of a plaintive single note uttered rather slowly in a descending scale. Whether we are really justified in speaking of these two separate phases as distinct is open to question. It is true that the one portion is sometimes detached from the other, but when the bird is in full song I am inclined to think that each goes to form part of the whole. After the arrival of a female, the male becomes careless in his song, and more frequently than not utters the last trill of the first phase and nothing more.

The food of the species is similar, so far as insect life is concerned, to that of the Willow Warbler or the Chiff-chaff; I have no evidence that fruit of any description is taken.

NOTICE TO SUBSCRIBERS.

Please to substitute pages 25 and 26 of Marsh Warbler issued
herewith for those issued in Part 7.

MARSH WARBLER

Marsh Warbler to prohibit the development of an earlier, and probably more advantageous, habit of nest building. Such a development may, indeed, be gradually taking place; for if at some earlier period the nesting instinct of this bird was similar to that of the Reed Warbler, we have an explanation of this curious variation. We can account for the comparatively late arrival of the Reed Warblers. They, in the majority of cases, construct their nests upon reeds which only attain the necessary height late in the season. Some, it is true, make use of the old reeds only, but not early in the season, since any tendency in the direction of too early nesting would be held in check by the fact that such nests could not fail to be more conspicuous, and therefore more liable to destruction. The habit of late arrival has, in their case, simply conformed to the needs of their environment. The Marsh Warblers on the other hand no longer depend for the construction of their nests upon the growth of any particular plant; they are no longer subject to the same selective agency, and consequently we find the instinct of migrating at a more or less definite period subject to considerable variation. To them earlier nesting may now be an advantage, since the likelihood of two broods being reared in one season is greater, and so the tendency towards an earlier arrival may be receiving encouragement instead of being checked; hence the extreme variation. If the individuals which breed in England and the western parts of Europe gain any advantage by their late arrival, how can we explain the fact that those which inhabit other parts of Europe, where the conditions of existence are very similar, arrive so very much earlier? In contrast with this remarkable variation we have the relative constancy in the date of arrival of the Reed Warbler throughout western Europe. Thus England is reached at the end of April or the first week in May, France, Hungary, Germany and Switzerland about the middle of April, Denmark at the commencement of May, while Heligoland is passed on migration in May. So that the arrival of this species in the various

countries alluded to may be said to occur approximately within a period of three weeks—a striking difference when compared with the corresponding period of two months during which the Marsh Warbler is arriving.

The localities frequented by the Marsh Warbler are different from those in which we are accustomed to find the Reed Warbler. The latter bird inhabits the dense masses of *Arundo phragmites*, and sometimes, it is true, when such conditions are not available, the withy beds that are found along the banks of our larger rivers; but for the Marsh Warbler the dense reed beds never seem to possess a similar attraction. There are records of the nest having been found amongst reeds—to the authenticity of which, however, some doubt is attached—and in Texel I was taken amongst the reeds in order to hear the males singing, but no trace of them was to be found; and it is doubtful whether my friends were really acquainted with the species. In the choice of a situation for breeding purposes a close proximity to water is by no means a necessity, for sometimes they inhabit steep banks, where a year or so previously the trees have been felled and the ground has become thickly overgrown with such bushes as hazel, elder, and ash, and carpeted with a luxuriant undergrowth, or even thick hedgerows surrounding orchards. On the other hand, they may be found along the very banks of a river, providing that the vegetation and bushes are sufficiently dense to afford protection. However, the osier bed seems to be preferred to any other situation, and by this term I mean small plantations of various descriptions, usually damp, sometimes surrounded by or even partially filled with water, but always having a relatively drier portion which can be resorted to by the birds for the purpose of reproduction. In Texel there are many of these small plantations in which the willows and other trees have been allowed to grow to a considerable size, but they are resorted to nevertheless so long as the undergrowth is sufficiently dense. I recollect two males inhabiting one such

